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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/939,332	08/24/2001	Farahmand E. Askarinam	5102/ETCH/DICP	3618

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APPLIED MATERIALS, INC.
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EXAMINER	
CROWELL, ANNA M	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,332	ASKARINAM ET AL.	
	Examiner	Art Unit	
	Michelle Crowell	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,16-19 and 21-26* is/are pending in the application.

4a) Of the above claim(s) *2-5* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,6-13,16-19 and 21-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bang et al. (WO 99/20811) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384).

Referring to Figures 2 and 3, and page 5, lines 26-30, and page 6, line 15-page 7, line 10, Bang discloses a chemical vapor deposition chamber comprising a vacuum lid 20 with base plate 48 (roof), a central recess 68 located in the bottom surface of the base plate 48, two gas distribution plates 72 and 88 mounted within the central recess 68, and opening 54 (center gas

feed) which supplies gas (gas feed channel). In addition, a plurality of gas dispersion apertures 75 and 90 are provided in each gas distribution plate 72 and 88.

Bang fails to show blind radial grooves with apertures inside the grooves.

Referring to Drawing 3 and the abstract, Okamoto teaches that it is known to provide a facing plane 6 (gas distribution plate) with blind radial grooves 8. By using, radial grooves, a substrate with a thin film having uniform thickness and quality is produced. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the gas distribution plate of Bang with the grooves with bores as shown by Okamoto. This would provide a substrate with a uniform film thickness.

Referring to Figures 8 and 9, column 9, line 60 – column 10, line 21, Fischer shows a gas distribution plate with grooves 39 disposed in plate 37. Each groove contains bores 5a (plurality of apertures) to distribute gas evenly. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the grooves of Bang in view of Okamoto with the bores as shown by Fischer. This would allow the gas to be evenly distributed in the chamber.

Referring to Figures 35A-E and 36A-B, column 16, lines 21-27, and column 27, lines 11-66, Collins teaches a plasma reactor with a ceiling 110 (roof) made from silicon carbide. This material allows the ceiling 110 to act as a conductor that can be grounded and act as a non-conductor to transmit a RF induction field from an antenna. It would have been obvious to one of ordinary skill in the art at the time of the invention to fabricate the roof of Bang with a silicon-based material as shown by Collins. This material is highly resistant to etching gases and acts as both a conductor and a nonconductor.

4. Claims 7, 10-13, 16-19, 21-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Bang et al. WO 99/20811) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384) as applied to claims 1, 6, 8, and 9 above, and further in view of Wicker et al. (U.S. 6,129,808), and Wu (U.S. 5,910,221).

The teachings of Bang in view of Okamoto, Fischer, and Collins have been discussed above.

Bang in view of Okamoto, Fischer, and Collins fail to teach that the roof and gas distribution plate are made and covered with silicon carbide.

Referring to Figure 8, and column 5, lines 10-43, column 6, lines 34-48, column 7, lines 31-50, and column 12, lines 16-24, Wicker teaches that it is known for a gas distribution plate 120 to be made from or coated with silicon carbide. This material has the desirable characteristics of high etch resistance, non-contaminating elements, and volatile etch products.

Referring to Figure 6, column 5, lines 46-53, column 6, lines 27-50, Wu teaches coating the plasma reactor's base plate 98 (roof) with a silicon carbide film 54. Moreover, the silicon carbide film is deposited using chemical vapor deposition (CVD). Silicon carbide CVD films reduce the production of particles and resultant contamination.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide or coat the roof and grooved, gas distribution plate of Bang in view of Okamoto, Fischer, and Collins with silicon carbide as taught by Wicker and Wu. This would provide high resistance to etch gases, and therefore prolong the life of the parts.

5. Claims 1, 6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Shan et al. (E.P. 0814495) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384).

Referring to Figures 1 and 3, and page 4, lines 22-27, Shan discloses a plasma chamber comprising a vacuum lid 24 (roof) having a central recess located in the bottom surface of the vacuum lid 24 and a gas distribution plate 44 mounted within the central recess.

Shan fails to show blind radial grooves with apertures inside the grooves.

Referring to Drawing 3 and the abstract, Okamoto teaches that it is known to provide a facing plane 6 (gas distribution plate) with blind radial grooves 8. By using, radial grooves, a substrate with a thin film having uniform thickness and quality is produced. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the gas distribution plate of Shan with the grooves with bores as shown by Okamoto. This would provide a substrate with a uniform film thickness.

Referring to Figures 8 and 9, column 9, line 60 – column 10, line 21, Fischer shows a gas distribution plate with grooves 39 disposed in plate 37. Each groove contains bores 5a (plurality of apertures) to distribute gas evenly. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the grooves of Shan in view of Okamoto with the bores as shown by Fischer. This would allow the gas to be evenly distributed in the chamber.

Referring to Figures 35A-E and 36A-B, column 16, lines 21-27, and column 27, lines 11-66, Collins teaches a plasma reactor with a ceiling 110 (roof) made from silicon carbide. This material allows the ceiling 110 to act as a conductor that can be grounded and act as a non-conductor to transmit a RF induction field from an antenna. It would have been obvious to one of ordinary skill in the art at the time of the invention to fabricate the roof of Shan with a silicon-

based material as shown by Collins. This material is highly resistant to etching gases and acts as both a conductor and a nonconductor.

6. Claims 7, 10-13, 16-19, 21-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Shan et al. (E.P. 0814495) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384) as applied to claims 1, 6, 8, and 9 above, and further in view of Wicker et al. (U.S. 6,129,808), and Wu (U.S. 5,910,221).

The teachings of Shan in view of Okamoto, Fischer, and Collins have been discussed above.

Shan in view of Okamoto, Fischer, and Collins fail to teach that the roof and gas distribution plate are made and covered with silicon carbide.

Referring to Figure 8, and column 5, lines 10-43, column 6, lines 34-48, column 7, lines 31-50, and column 12, lines 16-24, Wicker teaches that it is known for a gas distribution plate 120 to be made from or coated with silicon carbide. This material has the desirable characteristics of high etch resistance, non-contaminating elements, and volatile etch products.

Referring to Figure 6, column 5, lines 46-53, column 6, lines 27-50, Wu teaches coating the plasma reactor's base plate 98 (roof) with a silicon carbide film 54. Moreover, the silicon carbide film is deposited using chemical vapor deposition (CVD). Silicon carbide CVD films reduce the production of particles and resultant contamination.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide or coat the roof and grooved, gas distribution plate of Shan in view of

Okamoto, Fischer, and Collins with silicon carbide as taught by Wicker and Wu. This would provide high resistance to etch gases, and therefore prolong the life of the parts.

7. Claims 1, 6, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al. (U.S. 6,171,438) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384).

Referring to Figures 1, and column 7, lines 44-56, Masuda discloses a plasma chamber comprising a housing 114 (roof) having a central recess located in the bottom surface of the housing 114 and a gas distribution plate 115 mounted within the central recess.

Masuda fails to show blind radial grooves with apertures inside the grooves.

Referring to Drawing 3 and the abstract, Okamoto teaches that it is known to provide a facing plane 6 (gas distribution plate) with blind radial grooves 8. By using, radial grooves, a substrate with a thin film having uniform thickness and quality is produced. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the gas distribution plate of Masuda with the grooves with bores as shown by Okamoto. This would provide a substrate with a uniform film thickness.

Referring to Figures 8 and 9, column 9, line 60 – column 10, line 21, Fischer shows a gas distribution plate with grooves 39 disposed in plate 37. Each groove contains bores 5a (plurality of apertures) to distribute gas evenly. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the grooves of Masuda in view of Okamoto with the bores as shown by Fischer. This would allow the gas to be evenly distributed in the chamber.

Referring to Figures 35A-E and 36A-B, column 16, lines 21-27, and column 27,

lines 11-66, Collins teaches a plasma reactor with a ceiling 110 (roof) made from silicon carbide. This material allows the ceiling 110 to act as a conductor that can be grounded and act as a non-conductor to transmit a RF induction field from an antenna. It would have been obvious to one of ordinary skill in the art at the time of the invention to fabricate the roof of Masuda with a silicon-based material as shown by Collins. This material is highly resistant to etching gases and acts as both a conductor and a nonconductor.

8. Claims 7, 10-13, 16-19, 21-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Masuda et al. (U.S. 6,171,438) in view of Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (U.S. 5,422,139), and Collins et al. (U.S. 6,077,384) as applied to claims 1, 6, 8, and 9 above, and further in view of Wicker et al. (U.S. 6,129,808), and Wu (U.S. 5,910,221).

The teachings of Masuda in view of Okamoto, Fischer, and Collins have been discussed above.

Masuda in view of Okamoto, Fischer, and Collins fail to teach that the roof and gas distribution plate are made and covered with silicon carbide.

Referring to Figure 8, and column 5, lines 10-43, column 6, lines 34-48, column 7, lines 31-50, and column 12, lines 16-24, Wicker teaches that it is known for a gas distribution plate 120 to be made from or coated with silicon carbide. This material has the desirable characteristics of high etch resistance, non-contaminating elements, and volatile etch products.

Referring to Figure 6, column 5, lines 46-53, column 6, lines 27-50, Wu teaches coating the plasma reactor's base plate 98 (roof) with a silicon carbide film 54. Moreover, the silicon

carbide film is deposited using chemical vapor deposition (CVD). Silicon carbide CVD films reduce the production of particles and resultant contamination.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide or coat the roof and grooved, gas distribution plate of Masuda in view of Okamoto, Fischer, and Collins with silicon carbide as taught by Wicker and Wu. This would provide high resistance to etch gases, and therefore prolong the life of the parts.

Response to Arguments

9. Applicant's arguments filed August 28, 2003 have been fully considered but they are not persuasive.

Applicant has argued that Bang et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. fail to teach blind radial grooves. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant has argued that Okamoto et al. fails to teach blind slots 8 (grooves) coupled to the blow-out holes 7 (apertures). Okamoto et al. teaches blind radial grooves. Fischer et al. teaches grooves coupled with an aperture. Thus, the combination of Bang et al., Okamoto et al., Fischer et al., and Collins et al. teaches an apparatus having a plurality of apertures disposed within the grooves and extending through the gas distribution plate.

Applicant has argued that the grooves of Okamoto et al. are not blind. However, the slots 8 (grooves) of Okamoto et al. are indeed blind since the ends of the grooves 8 do not extend to the edge of the facing plane 6 (plate).

Applicant has argued that the grooves of Okamoto are not fluidly coupled to a center gas feed. As seen in Figure 4, the fluid that leaves center gas feed 9 travels through the holes 7 and into the grooves 8, and thus the center gas feed is in fluid communication with grooves 8.

Applicant has argued that the grooves of Okamoto et al. are used to remove gas from the reaction chamber. The claim does not preclude using the grooves to remove gas from the chamber. Additionally as seen in Figure 4, gas is supplied to the grooves 8.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC CMC

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